1. JP409193159A , Jul. 29, 1997, VULCANIZING METHOD FOR **TIRE** AND POST CURE BOX EMPLOYED THEREFOR; IKEDA, SHINJI,
INT-CL: B29C33/02; B29C35/02; B29C35/08; B29C35/16

JP409193159A L15: 1 of 23

ABSTRACT:

PROBLEM TO BE SOLVED: To improve the unification and stabilization of the quality of a finished **tire** by a method wherein post cure is effected employing microwaves in a post cure box, whose temperature is retained, after precuring by a press vulcanizing machine.

SOLUTION: A semi-vulcanized **tire** TH is cured employing **microwave**, generated by a **microwave** generating device 4, in a post cure box 3 succeedingly to precure effected by a press vulcanizing machine. **Microwave**, having the wavelength of about 1m-10cm and frequency of about 300-3,000MHz, which is so-called UHF can be employed. In this case, the precured **tire** TH is taken out of the press vulcanizing machine by a time, about 80-90% of a time necessitated for precuring. On the other hand, the internal temperature of a post cure box 3 is set so as to be 60-140°C and a turn table 22, on which the semi-vulcanized **tire** TH is put, is rotated to carry out the post cure uniformly.

2. JP408335496A , Dec. 17, 1996, UNIFORMLY HEATING METHOD FOR METALLIC MATERIAL EMBEDDED RUBBER PRODUCT; TAWARA, AKITOSHI, et al.,
INT-CL: H05B7/00

JP408335496A L15: 2 of 23

ABSTRACT:

PURPOSE: To provide a method for efficiently, uniformly heating a metallic material embedded rubber product such as a steel cord reinforced **tire** by **microwave** heating performed by controlling the electric field of a **microwave**.

CONSTITUTION: A steel cord reinforced green **tire** 5 is placed on a supporting table 4 within a **microwave** heating furnace 3, then while the supporting table 4 is rotated, the electric field of a **microwave** is formed with a **microwave** wave guide 2 within the heating furnace 3, and the green **tire** 5 is heated with the high frequency electric field. In this heating, imbalanced temperature rising generated between positions of the green **tire** 5 is corrected during heating.

3. JP408066924A , Mar. 12, 1996, MANUFACTURE OF PNEUMATIC **TIRE**; KURAUSU, UNZERUDO, et al.,
INT-CL: B29C33/02; B29C35/08; B29D30/06; B60C5/00

JP408066924A L15: 3 of 23

ABSTRACT:

PURPOSE: To provide a manufacturing method of a pneumatic **tire**, wherein the total heating time can be reduced by a method wherein **microwave** energy is used at leant for some part of heating energy.

CONSTITUTION: The manufacturing method is applied to the pneumatic

tire having a carcass spreading over two bead rings and a breaker arranged between the carcass and a tread rubber. Further, **tire** green cover is assembled with solely nonmetallic members. At the same time, **microwave** energy is at least used for some part of heat energy necessary in a vulcanizing and molding process, in which vulcanization and molding can be executed with heat and pressure.

4. JP408039576A , Feb. 13, 1996, APPARATUS AND METHOD FOR PRODUCING; KURAUSU, UNZERUTO,
INT-CL: B29C35/08

JP408039576A L15: 4 of 23

ABSTRACT:

PURPOSE: To eliminate **tire** defects caused by wrong thermal processing and thereby improve **tire** quality by using **microwave** energy as part of the heating energy for a heating mold, and controlling the direction of the **microwave** for vulcanization of various sites of a **tire** at different temperatures.

CONSTITUTION: **Microwave** guides 3 are provided on the top and bottom of a heating mold 1. The **microwave** energy from the guides 3 is reflected by **microwave** reflectors 2, 2 provided on the top and bottom of the mold 1 so as to radiate toward the entire periphery. The blades 8 of a **microwave** agitator are provided between the upper and lower reflectors 2, 2. By adjusting the incidence angle of the blades 8, the **microwave** energy applied to the a specific site can be increased. Accordingly, since the **microwave** energy can be concentrated on a specific site of a **tire**, the various sites of the **tire** can be vulcanized at different temperatures. The apparatus and method thus prevents defects otherwise caused by incorrect thermal processing, improves the quality of **tire** and reduces the vulcanizing time.

5. JP407118399A , May 9, 1995, STEEL CORD/RUBBER COMPOSITE FOR HIGH-FREQUENCY DIELECTRIC HEATING AND PNEUMATIC RADIAL **TIRE**; KANEKO, SATOSHI, et al.,
INT-CL: C08J5/04; B60C9/00; B60C9/18

JP407118399A L15: 5 of 23

ABSTRACT:

PURPOSE: To prevent the occurrence of nonuniformity of vulcanization, such as over vulcanization, and greatly improve the productivity in vulcanization by using a specified rubber composition for coating a steel cord for use in a steel cord reinforced unvulcanized rubber composite, which is subjected to high-frequency dielectric heating to effect vulcanization.

CONSTITUTION: A rubber composition having a volume resistivity of 1000Ωcm or lower is used for coating a steel cord for use in a steel cord reinforced unvulcanized rubber composite which is subjected to high-frequency dielectric heating, especially **microwave** heating, to effect vulcanization. It is desirable that the polymer contained in the rubber composition substantially comprises a natural rubber. The steel cord/rubber composite is preferably used for a pneumatic radial **tire**.

6. JP407086832A , Mar. 31, 1995, **MICROWAVE** OSCILLATOR; KANEMITSU, TAKAYUKI,
INT-CL: H03B5/18; H03B5/12

JP407086832A L15: 6 of 23

ABSTRACT:

PURPOSE: To widen the degree of freedom on design of a souce matching circuit and to miniaturize a circuit pattern by grounding the drain terminal of a field effect transistor, connecting one end of the resistor for supplying bias of the drain terminal to a drain grounding point and connecting the other end to a ground capacitor and an open stub respectively.

CONSTITUTION: A bias resistor 5 is directly connected to the drain terminal D for supplying bias to **tire** FET 1 for oscillation and the other end of the bias resitor 5 is connected to the ground capacitor 7 and the open stub 20 to be λ/4 to the frequency of approximately twice as much as an oscillation frequency band. Then, the FET 1 for the oscillation is drain grounded by the open stub 2, the oscillation is performed by a dielectric resonator 10 connected to a micro strip line 8 connected to a gate side and output is performed through a matching circuit 11 connected to a source terminal from an output terminal 13 as local oscillation signals. In this case, the open stub 20 of a drain side bias circuit is for grounding the bias resistor 5 and is selected so as to be λ/4 to the frequency of approximately twice as much as the oscillation frequency.

7. JP406297473A , Oct. 25, 1994, **TIRE** VULCANIZING DEVICE; OKAMURA, NOBUYUKI, et al.,
INT-CL: B29C35/08; B29C33/06

JP406297473A L15: 7 of 23

ABSTRACT:

PURPOSE: To allow **microwave** to reach a green **tire** even under the condition that an upper and a lower mold as well as an upper and a lower mold-mount and the like are not made of ceramic stock.

CONSTITUTION: The **tire** vulcanizing device concerned has a **microwave** emitting part 23, which is arranged in a **tire** mold 2 for vulcanizing a green **tire** 11 so as to emit **microwave** 19 from the inside of the hollow part 10 of the **tire** mold 2 to its outside.

8. JP405301232A , Nov. 16, 1993, METHOD FOR HEATING RUBBER ARTICLE HAVING DOUBLE LAYERED STRUCTURE BY **MICROWAVE**; MATSUZAWA, HIDETOSHI, et al.,
INT-CL: B29C35/08; B29D30/02

JP405301232A L15: 8 of 23

ABSTRACT:

PURPOSE: To uniformly perform preheating by applying a polar substance having a high loss factor to a sheet constituting a layer having a low loss factor and subsequently forming a double-layered structure from the coated sheet and other sheet to form the thin layer of the polar

outer peripheral surface of the solid **tire** 5 and the **microwave** is not directly applied to the outermost layer of the solid **tire** opposed to the reflecting member 6. Therefore, by forming the outermost layer as a layer having a high loss factor, the **microwave** wave applied to the outermost layer can be reduced as compared with the other layers and the solid **tire** 5 having a double layered structure can be uniformly preheated and the productivity at the time of preheating can be enhanced to a large extent.

11. JP405234696A , Sep. 10, 1993, **MICROWAVE** PLASMA ETCHING DEVICE; NAWATA, MAKOTO, et al.,
INT-CL: H05H1/46; H01L21/302

JP405234696A L15: 11 of 23

ABSTRACT:

PURPOSE: To provide a **microwave** plasma etching device providing high election ratio against a base silicon film by suppressing a decrease in **tire** etching rate of an oxide film in etching the oxide film.

CONSTITUTION: In a **microwave** plasma etching device, silicon carbide is used for an electrode cover 10, e.g. a constituent member of a vacuum container 4 for generating plasma. A high-frequency power is applied to the silicon carbide. This suppresses a decrease in the etching rate of an oxide film and provides high selection ratio against a bed silicon film.

12. JP405164825A , Jun. 29, 1993, CIRCUIT MODULE; SHIGA, NOBUO,
INT-CL: G01R31/28

JP405164825A L15: 12 of 23

ABSTRACT:

PURPOSE: To provide a circuit module allowing to readily measure the characteristic of a **microwave** circuit with good accuracy with nondestruction.

CONSTITUTION: Lead terminals 2, 3 connected to a package 1 mounting a **microwave** oscillator, etc., in the package are projected to the outside of the package. The lead terminals 2, 3 have length one-fourth electrical length. Each surface is laminated with an insulating material 5 such as glass. In addition, the length of the lead terminals 2, 3 has a length λ/4 of one-fourth electrical length after considering the material of **tire** insulating material 5. In characteristic measurement by using a circuit module, the lead terminals 2, 3 are merely superimposed on a measuring line 7 formed on a mother board 6, etc., for their positioning. In addition, the circuit module can be connected to a measuring circuit without adversely affecting the characteristic impedance etc. of the circuit.

13. JP405101785A , Apr. 23, 1993, COUPLED CAVITY TYPE TRAVELING-WAVE TUBE; TAKEUCHI, YOSHIFUMI,
INT-CL: H01J23/20

JP405101785A L15: 13 of 23

ABSTRACT:

PURPOSE: To reduce temperature rise at high-frequency circuit parts and to obtain a small cooling system by providing the foresaver of an input high- frequency circuit part and the backsaver of an adjoining IF with specific times the backsaver of an output high-frequency circuit part and the foresaver of an adjoining IF corresponding to **microwave** loss.

CONSTITUTION: Input part foresaver 4 and intermediate part backsaver 7 having low **microwave** loss are reduced corresponding to **microwave** loss to reduce **tire** projected parts of high-frequency circuit parts. As a result. turbulence of cooling air 8 and pressure loss are reduced to efficiently perform cooling at the high-frequency circuit parts and a collector part, resulting in controlling temperature rise at the high-frequency circuit parts. Namely, the foresaver of the input high-frequency circuit 1 and the backsaver of an adjoining intermediate high-frequency circuit part are provided with, for example, 0.5-0.8 times the foresaver of an intermediate high-frequency part faced to the above intermediate high-frequency circuit part. Thus, the projected parts of the saver parts are reduced to reduce the turbulence of cooling air and pressure loss, preventing temperature rise at the high-frequency circuit parts.

14. JP360017333A , Jan. 29, 1985, DEVICE FOR MEASURING INNER PRESSURE OF **TIRE**; SHIBATA, CHOKICHIRO, et al.,
INT-CL: G01L17/00

JP360017333A L15: 14 of 23

ABSTRACT:

PURPOSE: To detect the inner pressure of a **tire** or the like of an automobile economically and easily even in the travelling of the car by detecting the change of the shape of a pressure sensitive film by a **microwave**.

CONSTITUTION: The case 12 of a pressure sensitive sensor 10 is constituted of a dielectric body consisting of plastic or the like transmitting microwaves and an airtight room 18 seals injected air or the like and is kept at prescribed pressure P<SB>1</SB>. The surface of the pressure sensitive film 16 consisting of an elastic body is coated with a metallic film and reflects the microwaves. When the inner pressure P<SB>2</SB> of the **tire** is increased higher than the inner pressure P<SB>1</SB> of the airtight room 18, the pressure sensitive film 16 is deformed along an inside stopper 26 and a **microwave** 38 from a **microwave** transmitter/receiver 36 is reflected in a direction different from the incident direction and is not returned to an antenna of the transmitter/receiver 36. When the inner pressure is reduced, the pressure sensitive film 16 is deformed along the shape of an outer stopper 28 and the **microwave** 38 is reflected in the direction of the transmitter/receiver 36 and caught by the antenna.

15. JP358092550A , Jun. 1, 1983, **MICROWAVE** PREHEATING OF ELASTOMER ARTICLE; ARIMATSU, TOSHIO,
INT-CL: B29H5/01
ADDITIONAL-INT-CL: B29H5/26

JP358092550A L15: 15 of 23

ABSTRACT:

the temp. of said article to eliminate irregularity of temp. in a radial direction.

CONSTITUTION: An unvulcanized **tire** 2 is placed on a turn table 3 in a preheating chamber 1 and **microwave** is intermittently irradiated to a radial direction from the upper part by wave guide tubes 4, 4 while the table 3 is rotated. At the same time, **microwave** is intermittently irradiated from the side direction by horns 6, 6 to diffuse heat in the **tire** 2. When irradiation of high frequency is stopped, a mark 11 is detected by a reflection type photoelectric tube 12 to measured the temp. of the upper stage 2a of the unvulcanized **tire** 2 by an infrared ray thermometer 13. This temp. is stored and the output of the horn 6 is controlled by a preliminarily determined program. Subsequently, the horn 6 and the thermometer 13 are succeedingly lowered to the middle stage 2b and the lower stage 2c of the **tire** 2 to carry out irradiation and measurement of a temp. similarly.

18. JP357137135A , Aug. 24, 1982, HEATING METHOD OF ELASTOMER PRODUCT BY **MICROWAVE**; ARIMATSU, TOSHIO,
INT-CL: B29H5/02

JP357137135A L15: 18 of 23

ABSTRACT:

PURPOSE: To obtain a high quality vulcanized product, e.g., **tire**, etc., by a properly uniform heating method in which the weight of an elastomer product is measured before or immediately after vulcanization, and the elastomer product is sent into a **microwave** irradiator in which it is heated by **microwave** for a period of time proportional to the measured weight.

CONSTITUTION: An elastomer product 1, e.g., green **tire**, etc., is sent onto a belt conveyer 4 connected to a weight measurer 3 by a feed conveyer 2 and detected by a photoelectric tube detector 15. Then, the belt conveyer 4 is stopped and the weight of the elastomer product is measured automatically. Then, the **tire** 1 is transferred to a feed conveyer 2' and passed through a photoelectric tube detector 16, whereupon an air cylinder is operated to open the inlet 8 of a **microwave** irradiator 5. Then, the **tire** 1 is pu in the irradiator and stopped on a turn table 6, and then the turn table 6 is turned. The **tire** 1 is exposed to the irradiation of **microwave** through an irradiation port 14 for a period of time set by a timer 7, and then the product heat-treated by a feed conveyer 2" is carried out.

19. JP357137133A , Aug. 24, 1982, PREHEATING METHOD OF ELASTOMER PRODUCT; ARIMATSU, TOSHIO,
INT-CL: B29H5/02

JP357137133A L15: 19 of 23

ABSTRACT:

PURPOSE: To shorten the time of vulcanization while making use of the effect of high-frequency heating process by a method in which the surface of an elastomer product is preheated by hot air and the inside of the product is concurrently or after the preheating heated by high frequency.

CONSTITUTION: A **tire** 3, for example, is placed on a turn table 2, and hot air (about 100°C) in a temperature range in which no

vulcanization reaction occurs is sent into a heating chamber 1 from a supply port 10 in order to preheat the outside of the **tire** 3. Then, the inside of the **tire** 3 is heated to a given preheating temperature (about 100°C) by the irradiation of a high frequency with a temperature range in which no vulcanization reaction occurs by means of a **microwave** generator 6 and a **microwave** radiating horn 4. Thus, the outside and inside of the elastomer product can be uniformly preheated.

20. JP356150531A , Nov. 21, 1981, **MICROWAVE** HEATING METHOD AND DEVICE USED FOR SAID METHOD; OKAKURA, SHINJI,
INT-CL: B29H5/01; B29H5/26
ADDITIONAL-INT-CL: H05B6/78; H05B6/80

JP356150531A L15: 20 of 23

ABSTRACT:

PURPOSE: To heat a steel **tire** not vulcanized uniformly and preparatorily by irradiating microwaves so that an electric-field polarization surface of the microwaves inclines to steel wires.

CONSTITUTION: Microwaves in about 2,450MHz are irradiated from a horn type rectangular waveguide **microwave** radiator 17, which is arranged inclining to steel wires 11 at θ° while turning a steel **tire** not vulcanized in the arrow head 14 direction in an oven. An electric field E is generated in the orthogonal direction of a magnetic-field surface wall (h), an electric field component parallel with the wires 11 in the electric field is reflected by means of the wires and reheats sections close to an outer surface of the **tire**, and an electric field component rectangular to the wires 11 passes among the wires and heats an inside section of the **tire**. This heating method is preferable for the preparatory heating of the steel **tire** prior to vulcanization because the whole can be heated uniformly.

21. JP356137944A , Oct. 28, 1981, VULCANIZING METHOD FOR PREHEATED **TIRE**; ARIMATSU, TOSHIO,
INT-CL: B29H5/02

JP356137944A L15: 21 of 23

ABSTRACT:

PURPOSE: To eliminate the danger of insufficient vulcanization and thereby improve the quality of **tire** by combining a preheating system for a raw **tire** with a controlling system for the quantity of vulcanization by means of a computer.

CONSTITUTION: The raw **tire** immediately after being preheated by a **microwave** preheating device is inserted into a metal mold in a vulcanizing machine and, the vulcanizing machine being closed, vulcanization is started, while, simultaneously, the sensor needle of a temperature-sensitive part is inserted through the shoulder part of the raw **tire**. And, the temperature of the shoulder part is measured by a temperature measuring device whose main components are a linerizer and an A-D converter and the output thereof is inputted in the computer. The computer computes the quantity of vulcanization in accordance with the measured temperature, compares the same with a set value of a standard quantity of vulcanization inputted beforehand and opens the vulcanizing machine by an output signal obtained when the quantity of vulcanization accords with the standard quantity of vulcanization, whereby the entire